

REMARKS

The amendment to claim 14 finds support, for example, at page 1, lines 3-5 (humidity sensor for measuring the moisture content of an atmosphere by means of change in the electrical resistance of a moisture sensitive layer); at page 7, lines 3-4 (which measures moisture content on the basis of change in the resistance of the moisture sensitive layer); at page 17, lines 3-4 (resistance changing characteristics of the humidity sensor 1 with respect to a change in humidity is measured); and by reference to Fig. 4 (sensor impedance as a function of relative humidity).

Review and reconsideration on the merits are requested.

Claim 14 stands rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent 4,379,406 to Bennewitz et al in view of U.S. Patent 5,855,849 to Li et al, U.S. Patent 4,602,426 to Kampe et al, U.S. Patent 4,656,455 to Tanino et al, further in view of U.S. Patent 3,377,203 to Mobius et al.

Claims 15-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bennewitz et al in view of Li et al, Kampe et al, Tanino et al, Mobius et al, further in view of U.S. Patent 5,792,938 to Gokhfeld.

Claim 19 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bennewitz et al in view of Li et al, Kampe et al, Tanino et al, and Mobius et al, further in view of U.S. Patent 4,608,232 to Sunano et al.

Claims 20 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bennewitz et al, in view Li et al, Kampe et al, Tanino et al, Mobius et al and further in view of U.S. Patent 3,223, 609 to Reeds, Jr.

In the Advisory Action dated October 28, 2004, (i) the Examiner cites to Figs. 6 and 7 and the disclosure at column 6, lines 21-49 of Li et al as showing and describing a structure in which upper electrode 33 is joined to moisture sensitive layer 31 and a portion of insulating substrate 34. Furthermore, (ii) as motivation for the combination of Li et al and Bennewitz et al, the Examiner cites to Li et al at column 3, lines 25-65, which is said to allow for use of a pyrochlore-type tungsten trioxide as a sensing element in the specific structure described at the bottom of column 3. Moreover, (iii) although acknowledging that Kampe et al, Mobius et al and Tanino et al have nothing to do with humidity sensors or humidity-sensing parts, the Examiner maintains that the subject references are properly combinable with Bennewitz et al because the present claims require no more than a certain structure and do not tie such structure to a humidity measurement.

Applicants traverse, request the Examiner to reconsider in view of the amendment to claim 14, and address the above points in turn, as follows.

(i) Although the passage at column 6, lines 30-33 and at lines 43-48 describes forming the lower electrode, upper layer electrode and moisture sensitive layer on the insulating substrate, this is not a specific disclosure of an upper layer joined to both the moisture sensitive layer and a portion of the insulating substrate as claimed. Rather, this is a description of two electrodes and a moisture sensitive layer disposed on a support. Notably, in Figs. 6 and 7 of Li et al, the moisture sensitive layer is not joined to the support.

(ii) The invention of Li et al is said to exhibit excellent linearity between resistance and relative humidity, excellent ruggedness and durability, improved temperature and chemical

resistance, and improved durability for long term use at high-humidity environments (column 6, lines 57-63). However, these properties have nothing to do with the specific structure of the humidity sensor, but rather relate to the method used for forming the pyrochlore-type crystalline tungsten trioxide as recited in claim 1 of Li et al. As discussed in the response filed October 6, 2004, Li et al is primarily concerned with the composition of the moisture sensitive layer (or rather method of making the moisture sensitive layer), and nowhere describes or suggests that the structure of Figs. 6 and 7 would provide good linearity and improved durability.

For example, as described at column 5, lines 45-57 of Li et al.:

Conventionally, pyrochlore-tungsten trioxide was not considered as a suitable candidate material for making solid state humidity sensors because the pyrochlore-type tungsten trioxide will be transformed into a different crystalline phase when it is heated to temperatures of about 350°C, and most of the film coating processes involve heating the coating material above this temperature. During this heating process, the pyrochlore-type crystalline structure of tungsten trioxide would have been destroyed, thus rendering it impossible for use as a sensing element in a humidity sensor. The present invention allows the pyrochlore-type crystalline structure of tungsten trioxide to be advantageously utilized as a solid state humidity sensing material.

Li et al then further goes on to describe the inventive process of making the moisture sensitive layer, which allows the use of pyrochlore-type tungsten trioxide as a sensing element, at column 5, line 58 *et seq.* The specific process steps for forming the pyrochlore-type crystalline tungsten trioxide are set forth in claim 1 of Li et al, and include the steps of (a) dissolving a tungstate salt into an aqueous solution, (b) adjusting the pH of the aqueous tungstate salt solution to below 8.5, and (c) heating the pH-adjusted aqueous tungstate salt solution at temperatures above 70°C to cause formation of the pyrochlore-type crystalline tungsten trioxide. This is a

process for making a pyrochlore-type crystalline tungsten trioxide for use in a moisture sensor which solves the above-noted problems of the prior art, and has nothing to do with the structure *per se* of the humidity sensor.

(iii) The Examiner suggested that the invention may be better distinguished from the remaining secondary references by limiting the claimed moisture sensitive layer to one which provides a measurement of humidity. The Examiner reasoned that such limitation would structurally distinguish over Mobius et al, Tanino et al and Kampe et al which do not relate to humidity sensors. Namely, as previously noted, Mobius et al. relates to fuel cells, and not to humidity sensors. Tanino et al discloses a pore size of a filter film which has nothing to do with the humidity-sensing part of the present invention. Moreover, Kampe et al relates to improved gas diffusion electrodes for use in primary batteries, fuel cells and electrochemical cells, but not to humidity sensors. That is, it is respectfully submitted that there is no basis in the prior art for modifying the humidity sensor of Bennewitz et al to have an electrode pore size as taught by Kampe et al, a pore size of the moisture sensitive layer based on the pore size of a filter film as disclosed by Tanino et al, and electrodes containing ceramic particles as disclosed by Mobius et al, where each of these three references has nothing to do with humidity sensors.

Thus, although Applicants believe that claim 14 as presented in the Amendment under 37 C.F.R. § 1.111 filed April 20, 2004 is readily distinguished from the prior art, to further clarify these differences, claim 14 has been amended as suggested by the Examiner. Namely, claim 14 has been amended to recite that the humidity sensor is a humidity sensor for measuring the humidity of an atmosphere to which the humidity sensor is exposed, that the moisture sensitive

layer has an electrical resistance which changes with a change in humidity, and that the humidity sensor provides a measurement of humidity based on the electrical resistance of the moisture sensitive layer.

For the above reasons, and in view of the amendment to claim 14, it is respectfully submitted that the present claims are patentable over the cited references, and withdrawal of the foregoing rejections is respectfully requested.

Withdrawal of all rejections and allowance of claims 14-21 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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